

JAPAN

EDICT OF GOVERNMENT

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JIS S 0014 (2003) (English): Guidelines for the elderly and people with disabilities -- Auditory signals on consumer products -- Sound pressure levels of signals for the elderly and in noisy conditions

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*The citizens of a nation must
honor the laws of the land.*

Fukuzawa Yukichi

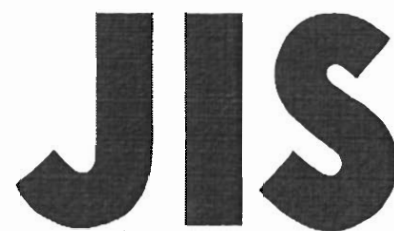
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JIS S 0014 : 2003

(AIST/NITE)

**Guidelines for the elderly and
people with disabilities—Auditory
signals on consumer products—
Sound pressure levels of signals for
the elderly and in noisy conditions**

ICS 13.120; 13.320; 97.020

Reference number : JIS S 0014 : 2003 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from National Institute of Advanced Industrial Science and Technology (AIST)/National Institute of Technology and Evaluation, Conformity Assessment Center (NITE), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

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Guidelines for the elderly and people with disabilities—Auditory signals on consumer products—Sound pressure levels of signals for the elderly and in noisy condition

Introduction At present consumers live their life surrounded by various consumer products such as electrical and electronic appliances, information and telecommunication devices, office automation equipment, gas or cooking and heating appliances, toys, sanitary accommodations, and health appliances which use auditory signals. These auditory signals may be indistinct due to a user's hypacusis which develops with aging or jamming sounds. This Japanese Industrial Standard is issued as guidelines (recommendations) when designing auditory signals which product users including the elderly with hypacusis can hear properly in consideration of the presence of jamming sounds. When using this Standard, a specified item can be selected suitably for the kind of product or other conditions. Furthermore, this Standard precludes the equipment for special use such as use for facilities, business use and professional use.

1 Scope This Standard specifies the guidelines (recommendations) for designing the range of sound pressure levels of auditory signals which the users of consumer products, especially visually impaired persons, the elderly with a visual impairment and hypacusis which develops with aging can hear properly in consideration of the presence of jamming sounds. However, auditory signals regulated by other statutes such as signals for fire alarms, signals for gas leakages, signals for crime prevention, and auditory signals of an electronic chime and a voice guide, and auditory signals peculiar to a communication tool such as telephones are excluded.

- Remarks 1 "Auditory signals", in this Standard, refer to the sound heard in the same room as that where the product is used or in the next room not shut off by walls.
- 2 "Auditory signals", in this Standard, refer to the auditory signal generally used of which the frequency is constant (also called a beep sound).
- 3 This Standard should apply even when using a frequency changing sound, a melody, etc.
- 4 Auditory signals heard through a head receiver or an earphone, and auditory signals heard with the ear being located near the sound source are excluded.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) shall be applied.

JIS C 1502 *Sound level meters*

JIS C 1505 *Precision sound level meters*

- JIS C 1513 *Octave-band and third-octave-band analyzers for sounds and vibrations*
- JIS S 0013 *Guidelines for the elderly and people with disabilities—Auditory signals on consumer products*
- JIS Z 8106 *International electrotechnical vocabulary Chapter 801 : Acoustical and electroacoustics*
- JIS Z 8731 *Acoustics—Description and measurement of environmental noise*

3 Definitions For the purposes of this Standard, the definitions shall be in accordance with **JIS S 0013** and **JIS Z 8106**, and the following definitions shall apply:

- a) **jamming sound** A product actuation sound or a living environment sound which is likely to have the biggest effect on listening comprehension of auditory signals to be designed.
- b) **product actuation sound** A sound generated by actuation of a consumer product incorporating auditory signals to be designed.
- c) **living environment sound** A sound generated in the room where a consumer product incorporating auditory signals to be designed is used, or, in the next room not shut off by walls, etc. This includes a sound generated by the behavior of a consumer (for example, the sound of water generated when washing the dishes in a kitchen), or an actuation sound of a product other than that incorporating auditory signals to be designed (for example, the actuation sound of a cleaner).
- d) **background noise** All sounds other than the sound to be measured (auditory signals or jamming sounds) at a measurement location.

Remarks : The sound not to be measured as jamming sound among living environment sounds shall be background noise.

4 Symbols The symbols used in this Standard shall be as follows:

- a) $L_{S,A}$: A-weighted sound pressure level of auditory signals (dB)
- b) $L_{N,A}$: A-weighted sound pressure level of jamming sound (dB)
- c) $L_{S,oct}$: Level of frequency band which has the maximum value among octave-band pressure levels of auditory signals (dB)
- d) $L_{N,oct}$: Octave-band pressure level (dB) of jamming sound at the same frequency band as $L_{S,oct}$
- e) $L_{S,1/3 oct}$: Level of frequency band which has the maximum value among third-octave-band pressure levels of auditory signals (dB)
- f) $L_{N,1/3 oct}$: Third-octave-band pressure level (dB) of jamming sound at the same frequency band as $L_{S,1/3 oct}$

5 Measuring method of sound pressure level of auditory signals

5.1 Measuring device The measuring device shall be as follows:

- a) For measurement, use a sound level meter specified in **JIS C 1502**, or a precision sound level meter specified in **JIS C 1505** (hereafter referred to as “level meters”).
- b) For performing octave-band analysis and third-octave-band analysis, use an analyzer specified in **JIS C 1513**.

5.2 Measurement location The measurement location shall be as follows:

- a) Perform the measurement in the room where the reflection of the face other than that on which a product is installed is as small as possible.
- b) Install a product on a table or a floor as robust as possible.

Remarks 1 When there is an installation method peculiar to a product, such as hanging on a wall, etc., install according to the method.

- 2 In the case where the product used as hand-held or a remote control device incorporating the sounding source is to be measured, the product may be supported with a suitable holder instead of being placed on the plane.

- c) When measuring according to the method specified in **5.4 a)** or **5.4 b)**, the background noise shall be lower than the sound pressure level of the auditory signal measured according to the method by not less than 10 dB.

5.3 Position of measurement point The position of the measurement point shall be as follows:

- a) Place a microphone towards the control unit of a product at the position which corresponds to the head centre of a user when the user of the product is reaching for it to operate it. The distance between the microphone and the control unit of the product at this time shall be 500 mm.
- b) The position of measurement point shall be determined as shown in Fig. 1 according to the respective cases, such as, the case where the control unit is located at the front side of the product, where the control unit is located at the upper part of product and where the control unit of product or the remote control device is located on the wall, etc. However, when the position of measurement point shown in Fig. 1 differs largely from the head centre of the user at the time of operation of the product due to the construction of the product, a suitable position other than that shown in Fig. 1 may be determined as the measurement point.

Unit: mm

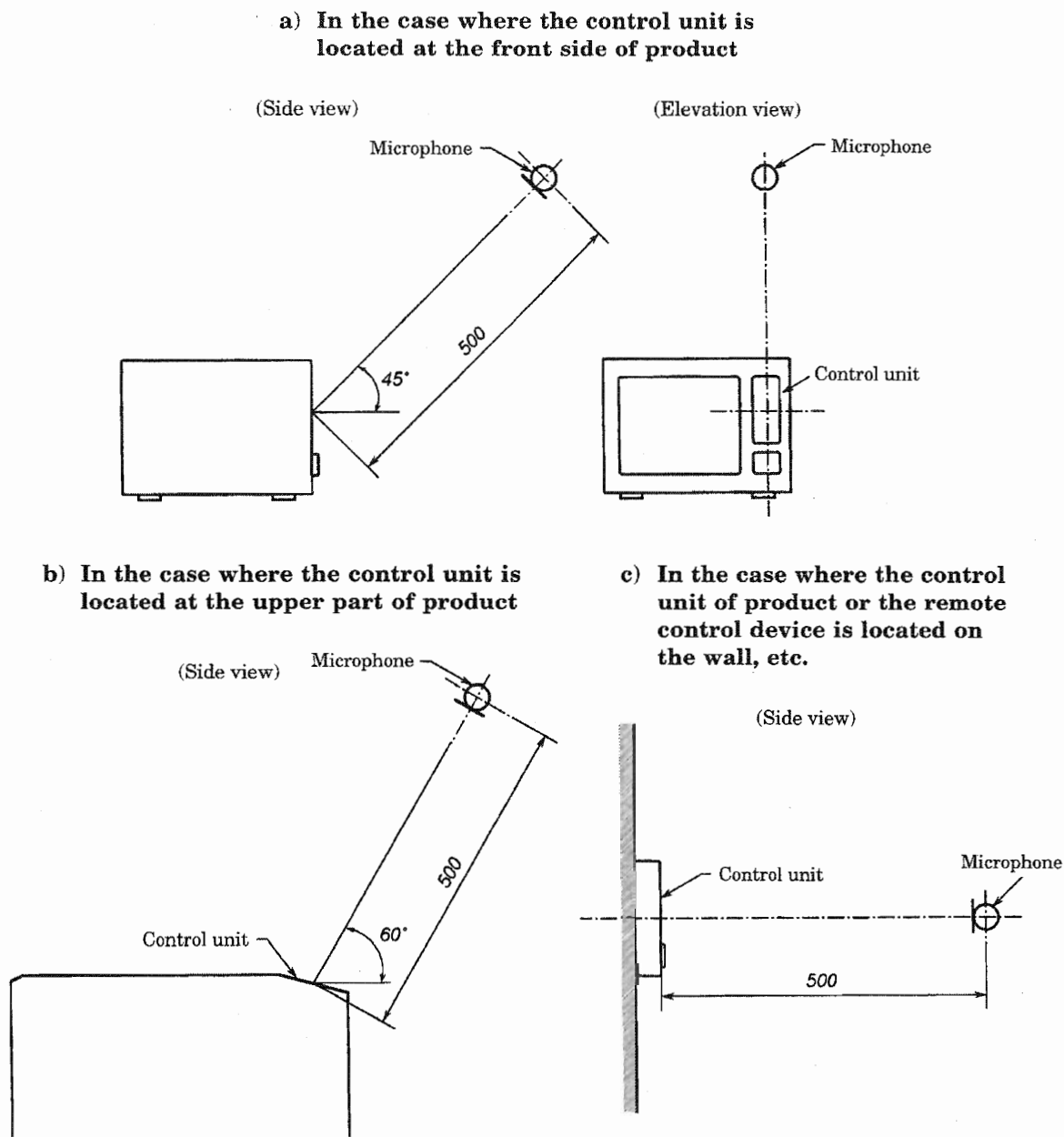


Fig. 1 Position of measurement point of auditory signals

5.4 Measurement of sound pressure level The measurement of sound pressure level shall be performed as follows:

- a) **Measurement of A-weighted sound pressure level** The setting of sound pressure level of auditory signals, when using the method in 7.2 a), shall be performed as follows:

- 1) Make the auditory signal sound with the sounding source incorporated in the inner part of product used. At this time make the actuation of product stop.
 - 2) The frequency weighted characteristics of a level meter shall be A-weighted. Furthermore, the time weighted characteristics of a level meter shall be F.
 - 3) Allow the auditory signal to sound continuously. When it only sounds for a short period of not more than 0.5 s unavoidably, read the maximum value of indication of a level meter.
 - 4) Repeat the measurement four times, and read the indicated value of the level meter each time. The average of those indicated values shall be taken as $L_{S,A}$ (dB).
 - 5) Measure the background noise at the position of measurement point. At this time make the sounding of auditory signal and the actuation of product stop.
- b) **Measurement of octave-band pressure level or third-octave-band pressure level** When using the method in 7.2 b) or 7.2 c) for setting the sound pressure level of auditory signal, the measurement shall be performed as follows:
- 1) Make the auditory signal sound with the sounding source incorporated in the internal part of product used. At this time make the actuation of product stop.
 - 2) The frequency weighted characteristics of a level meter shall have flat characteristics. Furthermore, the time weighted characteristics of a level meter shall be F.
 - 3) Allow the auditory signal to sound continuously. When it only sounds for a short period of not more than 0.5 s unavoidably, read the maximum value of indication of octave-band analyzer or third-octave-band analyzer.
 - 4) Repeat the measurement four times, and read the indicated value of octave-band analyzer or third-octave-band analyzer each time. Average those indicated values, and the value of frequency band which shows the maximum sound pressure level shall be taken as $L_{S,oct}$ (dB) or $L_{S,1/3 oct}$ (dB), respectively.
 - 5) Measure the background noise at the position of measurement point. At this time make the sounding of auditory signal and the actuation of product stop.

6 Measuring method of sound pressure level of jamming sound

6.1 Measuring device The measuring device shall be as follows:

- a) For measurement, an integrating-averaging sound level meter which is capable of measuring the equivalent continuous A-weighted sound pressure level specified in **JIS Z 8731** should be used.
- b) For performing octave-band analysis and third-octave-band analysis, use an analyzer specified in **JIS C 1513**.

6.2 Measurement location The measurement location shall be as follows:

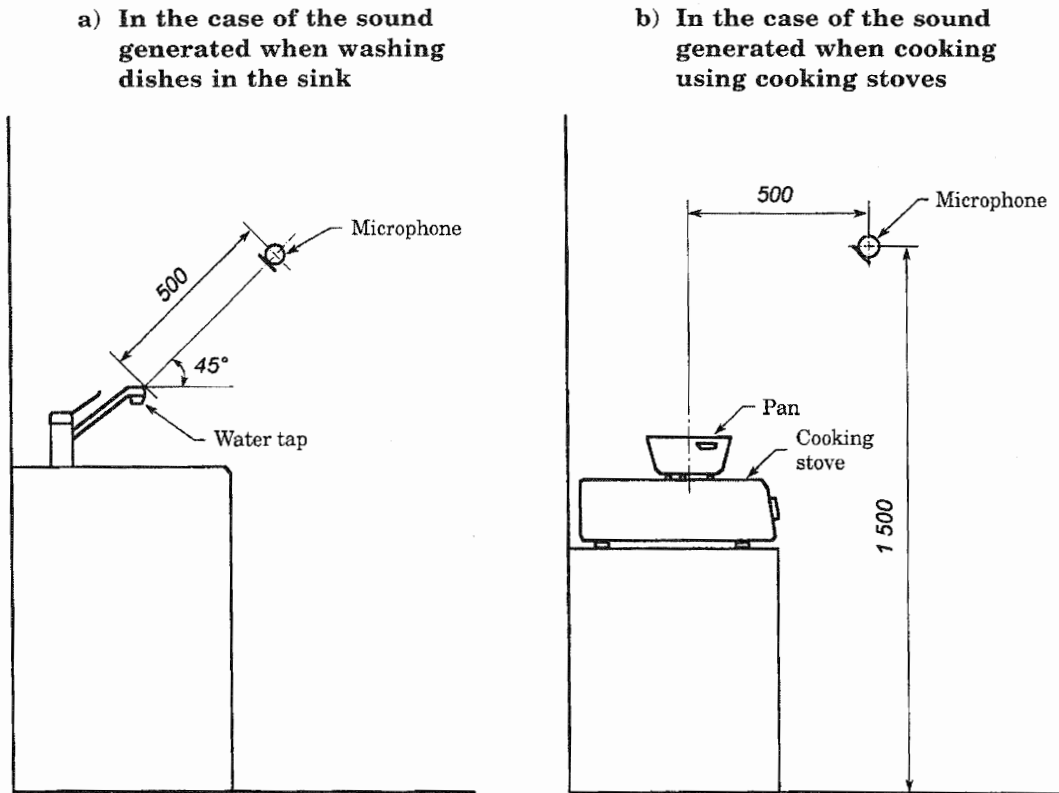
- a) For the product actuation sound to be measured, perform the measurement in the room where reflection of the face other than that on which a product is installed is as small as possible.
- b) For the living environment sound to be measured, perform the measurement inside a general dwelling house or in the room of a simulated dwelling house.
- c) When measuring according to the method specified in **6.4 a)** or **6.4 b)**, the background noise shall be lower than the sound pressure level of auditory signal measured according to the method by not less than 10 dB.

6.3 Position of measurement point The position of measurement point shall be as follows:

- a) For the product actuation sound to be measured, place a microphone towards the control unit of a product at the position which corresponds to the head centre of a user when using the product as shown in Fig. 1. When, for the measurement of auditory sound, the position other than that in Fig. 1 is determined as the measurement point, the measurement point of the product actuation sound shall be the same position as that.
- b) For the living environment sound to be measured, place a microphone towards the sound source at the position which corresponds to the head centre of a user who hears the living environment sound.

Information : For the sound of water generated when washing dishes in the sink and the sound generated when cooking using cooking stoves is to be measured, the positions shown in Informative Fig. 1 may be determined as the measurement points, respectively. Furthermore, for the auditory signals supposed to be heard in another room separated by a wall, the suitable position in another room may be determined as the measurement point, and the sound pressure level may be set by measuring according to the method in **6.4** with the method in **7.2** as a guide.

Unit: mm



Informative Fig. 1 Position of measurement point of living environment sound

6.4 Measurement of sound pressure level The measurement of sound pressure level shall be as follows:

- a) **Measurement of A-weighted sound pressure level** The setting of sound pressure level of auditory signals, when using the method in 7.2 a), shall be performed as follows:
- 1) Generate the intended jamming sound and measure the sound.
 - 2) In the case of the intended jamming sound with a big time variation, measure the period when the most typical sound is generated.
 - 3) The frequency weighted characteristics of a level meter shall be A-weighted. Furthermore, the time weighted characteristics of a level meter shall be F.
 - 4) The measuring time shall be 15 s at least.
 - 5) When measuring, the person in charge of measurement shall take care not to cause the interception of jamming sound, or such that may have effects on the measured values.

- 6) Repeat the measurement four times, and read the indicated value of the level meter each time. The average of those indicated values shall be taken as $L_{N,A}$ (dB).

Remarks : The energy average should be measured with the integrating-averaging sound level meter.

- 7) Measure the background noise at the position of measurement point. At this time make the generation of jamming sound stop.

b) **Measurement of octave-band level or third-octave-band level** When using the method in 7.2 b) or 7.2 c) for setting the sound pressure level of auditory signal, the measurement shall be performed as follows:

- 1) Generate the intended jamming sound and measure the sound.
- 2) In the case of the intended jamming sound with a big time variation, measure during the period when the most typical sound is generated.
- 3) The frequency weighted characteristics of a level meter shall have flat characteristics. Furthermore, the time weighted characteristics of a level meter shall be F.
- 4) The measuring time shall be 15 s at least.
- 5) When measuring, the person in charge of measurement shall take care not to cause the interruption of jamming sound or such that may have effects on the measured values.
- 6) Repeat the measurement four times, and read the indicated value of octave-band analyzer or the third-octave-band analyzers each time. Average those indicated values, and the value of frequency band which shows the maximum sound pressure level shall be taken as $L_{N,oct}$ (dB) or $L_{N,1/3 oct}$ (dB), respectively.

Remarks : The energy average should be measured with the integrating-averaging sound level meter.

- 7) Measure the background noise at the position of measurement point. At this time make the generation of jamming sound stop.

7 Setting method of sound pressure level of auditory signal

7.1 When not taking jamming sound into consideration When setting the sound pressure level of auditory signal, in the case where the effects on the measured values can be ignored because the assumed sound pressure level of jamming sound in the use environment of products is extremely low, etc., take into consideration only the users' hearing ability change with aging, and set the sound pressure level of auditory signal so that the requirements in the following a) and b) are met.

In addition, the frequency of auditory signal should be no more than 2 500 Hz (see JIS S 0013). However, when using the auditory signal of more than 2 500 Hz in frequency unavoidably, set the sound pressure level which is appropriately audible to users according to the method in the following a) and b).

- a) **Method by octave-band analysis** The setting by octave-band analysis shall be performed as follows:

Remarks : The higher-precision setting of sound pressure level should be performed according to the method in 7.1 b).

- 1) **Setting of lower limit** The setting of the lower limit shall be performed as follows:

1.1) The lower limit shall be as given in Table 1.

Table 1 Lower limit of $L_{S, \text{oct}}$ and $L_{S, 1/3 \text{ oct}}$

Centre frequency Hz	250	500	1 000	2 000	4 000
Level dB	30	25	25	35	60

- 1.2) In the case of reception and start signal, base point signal, end signal (when hearing mostly away from equipment) and strong caution signal of less than 5 times in repeat count according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the lower limit higher than the value specified in 1.1) by 5 dB.

- 2) **Setting of upper limit** The setting of the upper limit shall be performed as follows:

2.1) The upper limit shall be 75 dB.

- 2.2) In the case of end signal (when hearing mostly away from equipment) and strong caution signal according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the upper limit higher than the value specified in 2.1) by 5 dB.

- b) **Method by third-octave-band analysis** The setting by third-octave-band analysis shall be performed as follows:

- 1) **Setting of lower limit** The setting of the lower limit shall be performed as follows:

1.1) The value in Table 1* shall be the lower limit of $L_{S, 1/3 \text{ oct}}$.

Note * For the frequency band not given in Table, the sound pressure level is obtained by interpolating from the values of the upper and lower frequency bands.

- 1.2) In the case of reception and start signal, base point signal, end signal (when hearing mostly away from equipment) and strong caution signal of less than 5 times in repeat count according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the lower limit higher than the value specified in 1.1) by 5 dB.

- 2) **Setting of upper limit** The setting of the upper limit shall be performed as follows:

2.1) The upper limit shall be 75 dB.

- 2.2) In the case of end signal (when hearing mostly away from equipment) and strong caution signal according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the upper limit higher than the value specified in 2.1) by 5 dB.

7.2 When taking jamming sound into consideration When setting the sound pressure level of auditory signal, in the case where the effects of the assumed jamming sound in the use environment of products and the users' hearing ability change with aging on the measured values are taken into consideration, set the sound pressure level of auditory signal so that any method in the following a) to c) are met.

In addition, the frequency of auditory signal should be no more than 2 500 Hz (see **JIS S 0013**). However, when using the auditory signal of more than 2 500 Hz in frequency unavoidably, set the sound pressure level which is appropriately audible to users according to the method in the following a) to c).

- a) **Method by A-weighted sound pressure level** The setting of A-weighted sound pressure level of auditory signal shall be performed as follows:

Remarks : The higher-precision setting of sound pressure level should be performed according to the method in 7.2 b) or 7.2 c).

- 1) **Setting of lower limit** The setting of the lower limit shall be performed as follows:

1.1) Make the relative sound pressure level ($L_{S,A} - L_{N,A}$) of auditory signal to jamming sound not less than -5 dB.

1.2) In the case of reception and start signal, base point signal, end signal (when hearing mostly away from equipment) and strong caution signal of less than 5 times in repeat count according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the lower limit higher than the value specified in 1.1) by 5 dB.

- 2) **Setting of upper limit** The setting of the upper limit shall be performed as follows:

2.1) Make the relative sound pressure level ($L_{S,A} - L_{N,A}$) of auditory signal to jamming sound not more than 15 dB.

2.2) When $L_{S,A}$ of the upper limit exceeds 75 dB as a result of setting in 2.1), the upper limit shall be 75 dB.

2.3) In the case of end signal (when hearing mostly away from equipment) and strong caution signal according to the classification of auditory signals specified in clause 3 of **JIS S 0013**, make the upper limit higher than the value specified in 2.1) and 2.2) by 5 dB.

- b) **Method by octave-band analysis** The setting of auditory signal by octave-band analysis shall be performed as follows:

Remarks : The higher-precision setting of sound pressure level should be performed according to the method in 7.2 c).

- 1) **Setting of lower limit** The setting of the lower limit shall be performed as follows:

- 1.1) Make the relative sound pressure level ($L_{S, \text{oct}} - L_{N, \text{oct}}$) of auditory signal to jamming sound not less than the value given in Table 2.

Table 2 Lower limit of relative sound pressure level ($L_{S, \text{oct}} - L_{N, \text{oct}}$) of auditory signal to jamming sound

Centre frequency Hz	250	500	1 000	2 000	4 000
Relative sound pressure level of auditory signal to jamming sound dB	5	5	5	0	5

- 1.2) When $L_{S, \text{oct}}$ of the lower limit is less than the value given in Table 1 as a result of setting in 1.1), the setting in 1.1) shall not be applied. In this case the value given in Table 1 shall be taken as the lower limit of $L_{S, \text{oct}}$.
- 1.3) In the case of reception and start signal, base point signal, end signal (when hearing mostly away from equipment) and strong caution signal of less than 5 times in repeat count according to the classification of auditory signals specified in clause 3 of JIS S 0013, make the lower limit higher than the value specified in 1.1) and 1.2) by 5 dB.
- 2) **Setting of upper limit** The setting of the upper limit shall be performed as follows:
- 2.1) Make the relative sound pressure level ($L_{S, \text{oct}} - L_{N, \text{oct}}$) of auditory signal to jamming sound not more than 25 dB.
- 2.2) When $L_{S, \text{oct}}$ of the upper limit exceeds 75 dB as a result of setting in 2.1), the upper limit shall be 75 dB.
- 2.3) In the case of end signal (when hearing mostly away from equipment) and strong caution signal according to the classification of auditory signals specified in clause 3 of JIS S 0013, make the upper limit higher than the value specified in 2.1) and 2.2) by 5 dB.
- c) **Method by third-octave-band analysis** The setting of auditory signal by third-octave-band analysis shall be performed as follows:
- 1) **Setting of lower limit** The setting of the lower limit shall be performed as follows:
- 1.1) Make the relative sound pressure level ($L_{S, 1/3 \text{ oct}} - L_{N, 1/3 \text{ oct}}$) of auditory signal to jamming sound not less than the value given in Table 3*.

Table 3 Lower limit of relative sound pressure level ($L_{S, 1/3 \text{ oct}} - L_{N, 1/3 \text{ oct}}$) of auditory signal to jamming sound

Centre frequency Hz	250	500	1 000	2 000	4 000
Relative sound pressure level of auditory signal to jamming sound dB	10	10	10	5	10

- 1.2) When $L_{S, 1/3 \text{ oct}}$ of the lower limit is less than the value given in Table 1* as a result of setting in 1.1), the setting in 1.1) shall not be applied. In this case the value given in Table 1 shall be taken as the lower limit of $L_{S, 1/3 \text{ oct}}$.
- 1.3) In the case of reception and start signal, base point signal, end signal (when hearing mostly away from equipment) and strong caution signal of less than 5 times in repeat count according to the classification of auditory signals specified in clause 3 of JIS S 0013, make the lower limit higher than the value specified in 1.1) and 1.2) by 5 dB.
- 2) **Setting of upper limit** The setting of the upper limit shall be performed as follows:
 - 2.1) Make the relative sound pressure level ($L_{S, 1/3 \text{ oct}} - L_{N, 1/3 \text{ oct}}$) of auditory signal to jamming sound not more than 30 dB.
 - 2.2) When $L_{S, 1/3 \text{ oct}}$ of the upper limit exceeds 75 dB as a result of setting in 2.1), the upper limit shall be 75 dB.
 - 2.3) In the case of end signal (when hearing mostly away from equipment) and strong caution signal according to the classification of auditory signals specified in clause 3 of JIS S 0013, make the upper limit higher than the value specified in 2.1) and 2.2) by 5 dB.

8 Record When setting the sound pressure level of auditory signal, the following items should be recorded as appropriate.

a) **Measurement date and measurement location**

Example: Measurement date: Year, Month, Day

Measurement location: ○○ Business establishment model room

b) **Kind and model number of product**

Example: Kind and model number of product: Microwave oven, model number
○○-○○○○

c) **Kind and model number of measurement device**

Example: Kind of measurement device: Sound level meter, model number ○○
○○-○○ and third-octave-band analyzer, model number ××××-××

d) **Position of measurement point of auditory signal**

Example: Position of measurement point of auditory signal: Install a microphone at the position shown in Fig. 1 to a product.

e) **Kind of jamming sound**

Example: Kind of jamming sound: Sound of water of a sink in a kitchen Water flow, ○○ L/min

f) **Position of measurement point of jamming sound**

Example: Position of measurement point of jamming sound: Install a microphone at the position equivalent to that in Fig. 1 to the end of water tap in a sink.

g) **Kind of measuring method of sound pressure level of auditory signal and jamming sound**

Example: Kind of measuring method of sound pressure level of auditory signal and jamming sound: Measurement by third-octave-band analysis

h) **Measurement result of sound pressure level of auditory signal and jamming sound**

1) $L_{S,A}$, $L_{S,oct}$ or $L_{S,1/3 oct}$

2) $L_{N,A}$, $L_{N,oct}$ or $L_{N,1/3 oct}$

Remarks : In the case of octave-band analysis and third-octave-band analysis, the frequency band to be measured shall be written in parenthesis.

Examples 1) Measurement result of sound pressure level of auditory signal:

$$L_{S,1/3 oct} = 62 \text{ dB (2 000 Hz)}$$

2) Measurement result of sound pressure level of jamming sound:

$$L_{N,1/3 oct} = 51 \text{ dB (2 000 Hz)}$$

Annex (informative)

Example of measurement and setting of sound pressure level of auditory signals

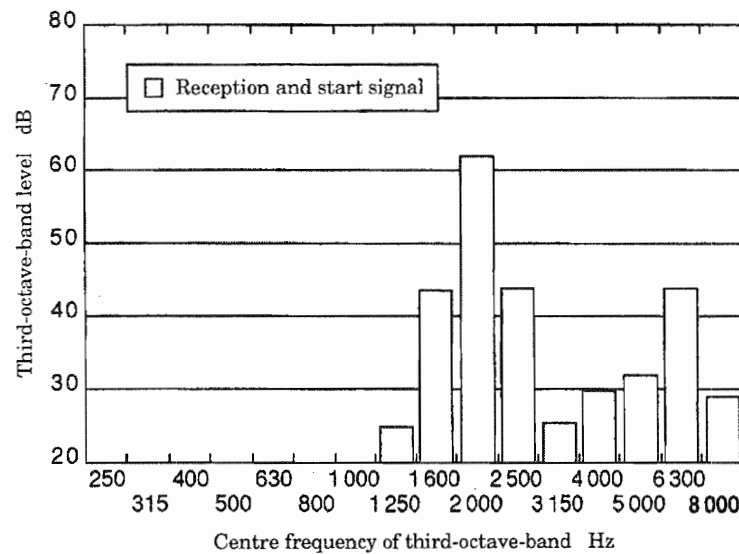
Introduction This Annex (informative) describes the measurement and setting method of sound pressure level of auditory signals based on examples, and does not constitute provisions of this Standard.

In this Annex (informative), a microwave oven is taken up for an example as a consumer product, and the example of measurement and setting of sound pressure level of reception and start signal and end signal which tells the end of cooking incorporated in the microwave oven is shown. The microwave oven is taken to be used in a kitchen, and the sound of water generated when washing dishes in a sink is assumed as the main jamming sound. For the sound pressure level of reception and start signal, the example in which the sound pressure level is measured and set by third-octave-band analysis is shown. For the sound pressure level of end signal, the example in which, in order to explain the procedures as comparing, the sound pressure level of the same end signal and jamming sound is measured and set by A-weighted sound pressure level and third-octave-band analysis is shown.

1 Example of setting of sound pressure level of reception and start signal

The example of setting of sound pressure level of reception and start signal is given as follows:

- a) **Kind of product** Microwave oven
- b) **Kind of measuring device** Sound level meter and third-octave-band analyzer
- c) **Position of measurement point of reception and start signal** A microphone is installed at the position in Fig. 1 a) of the text to a product.
- d) **Kind of measuring method of sound pressure level of reception and start signal** Measurement by third-octave-band analysis
- e) **Measurement result of sound pressure level of reception and start signal** The measurement result of sound pressure level of reception and start signal is shown in Annex Fig. 1.



Annex Fig. 1 Measurement result of reception and start signal

- 1) $L_{S, 1/3 \text{ oct}} = 62 \text{ dB (2 000 Hz)}$
 - 2) $L_{N, 1/3 \text{ oct}}$: nothing
- f) **Setting of sound pressure level of reception and start signal** The reception and start signal is the auditory signal heard while a user operates a product under stop directly. Therefore, it is not necessary to take the actuation sound into consideration, and it is expected that the living environment sound which exists simultaneously is also comparatively small. The method in 7.1 b) of the text which does not take jamming sound into consideration is applied to the setting of sound pressure level.

The lower limit of $L_{S, 1/3 \text{ oct}}$ is 40 dB obtained by adding 5 dB to the value (35 dB) in Table 1 of the text according to 7.1 b) 1.2). On the other hand, the upper limit of $L_{S, 1/3 \text{ oct}}$ is 75 dB according to 7.1 b) 2.1). Therefore, the value (62 dB) of $L_{S, 1/3 \text{ oct}}$ of reception and start signal is between the upper limit (75 dB) and the lower limit (40 dB), and it turns out that it can be used as a suitable auditory signal which many users including the elderly can hear.

2 Example of setting of sound pressure level of end signal

2.1 Example of method by A-weighted sound pressure level The example of setting of the method by A-weighted sound pressure level is as follows:

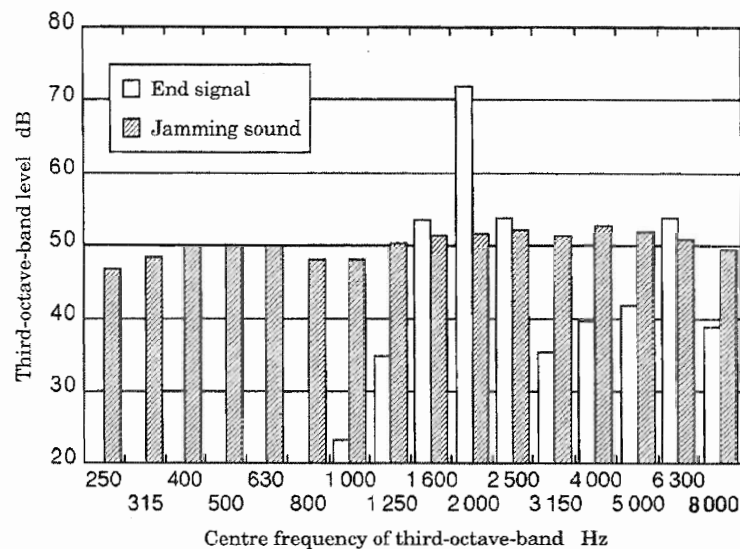
- a) **Kind of product** Microwave oven
- b) **Kind of measuring device** Sound level meter
- c) **Position of measurement point of end signal** A microphone is installed at the position in Fig. 1 a) of the text to a product.
- d) **Kind of jamming sound** The sound of water generated in a sink of a kitchen
Water flow, 9.6 L/min

- e) **Position of measurement point of jamming sound** Install a microphone at the position equivalent to that in Informative Fig. 1 a) of the text to the end of water tap in a sink.
- f) **Kind of measuring method of sound pressure level of end signal and jamming sound** Measurement of A-weighted sound pressure level
- g) **Measurement result of sound pressure level of end signal and jamming sound**
 - 1) $L_{S,A} = 73$ dB
 - 2) $L_{N,A} = 64$ dB
- h) **Setting of sound pressure level of end signal** The sound of water generated in a sink is one of the main jamming sounds generated in a kitchen, and it is desirable that the end signal which tells the end of cooking can be heard. The method in 7.2 a) of the text by A-weighted sound pressure level is applied to the setting of sound pressure level.

The lower limit of $L_{S,A}$ is 64 dB ($64 - 5 + 5 = 64$) obtained by adding relative sound pressure level (-5 dB) according to 7.2 a) 1.1) and 5 dB according to 7.2 a) 1.2) to the value of $L_{N,A}$ (64 dB). On the other hand, in order to obtain the upper limit of $L_{S,A}$, although 79 dB is obtained by adding the relative sound pressure level (15 dB) according to 7.2 a) 2.1) to the value of $L_{N,A}$ (64 dB), make this value 75 dB according to 7.2 a) 2.2). Furthermore, the upper limit of $L_{S,A}$ becomes 80 dB obtained by adding 5 dB according to 7.2 a) 2.3). Therefore, the value of $L_{S,A}$ (73 dB) of reception and start signal is between the upper limit (80 dB) and the lower limit (64 dB), and even though the jamming sound (sound of water in a sink) exists, it turns out that it can be used as a suitable auditory signal which many users including the elderly can hear.

2.2 Example of method by third-octave-band analysis The example of setting of the method by third-octave-band analysis is given as follows:

- a) **Kind of product** Microwave oven
- b) **Kind of measuring device** Sound level meter and third-octave-band analyzer
- c) **Position of measurement point of end signal** A microphone is installed at the position in Fig. 1 a) of the text to a product.
- d) **Kind of jamming sound** The sound of water generated in a sink of a kitchen Water flow, 9.6 L/min.
- e) **Position of measurement point of jamming sound** Install a microphone at the position equivalent to that in Informative Fig. 1 a) of the text to the end of water tap in a sink.
- f) **Kind of measuring method of sound pressure level of end signal and jamming sound** Measurement by third-octave-band analysis
- g) **Measurement result of sound pressure level of end signal and jamming sound** The measurement result of sound pressure level of end signal and jamming sound is shown in Annex Fig. 2.



Annex Fig. 2 Measurement result of end signal and jamming sound

- 1) $L_{S, 1/3 \text{ oct}} = 72 \text{ dB (2 000 Hz)}$
 - 2) $L_{N, 1/3 \text{ oct}} = 52 \text{ dB (2 000 Hz)}$
- h) **Setting of sound pressure level of end signal** The sound of water generated in a sink is one of the main jamming sounds generated in a kitchen, and it is desirable that the end signal which tells the end of cooking can be heard. The method in 7.2 c) of the text by A-weighted sound pressure level is applied to the setting of sound pressure level.

The lower limit of $L_{S, 1/3 \text{ oct}}$ is 62 dB ($52 + 5 + 5 = 62$) obtained by adding relative sound pressure level (5 dB) according to Table 3 of the text and 5 dB according to 7.2 c) 1.3) to the value of $L_{N, 1/3 \text{ oct}}$ (52 dB). On the other hand, in order to obtain the upper limit of $L_{S, 1/3 \text{ oct}}$, although 82 dB is obtained by adding the relative sound pressure level (30 dB) to the value of $L_{N, 1/3 \text{ oct}}$ (52 dB), make this value 75 dB according to 7.2 c) 2.2). Furthermore, the upper limit of $L_{S, 1/3 \text{ oct}}$ becomes 80 dB obtained by adding 5 dB according to 7.2 c) 2.3). Therefore, the value of $L_{S, 1/3 \text{ oct}}$ (72 dB) of reception and start signal is between the upper limit (80 dB) and the lower limit (62 dB), and even though the jamming sound (sound of water in a sink) exists, it turns out that it can be used as a suitable auditory signal which many users including the elderly can hear.

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